

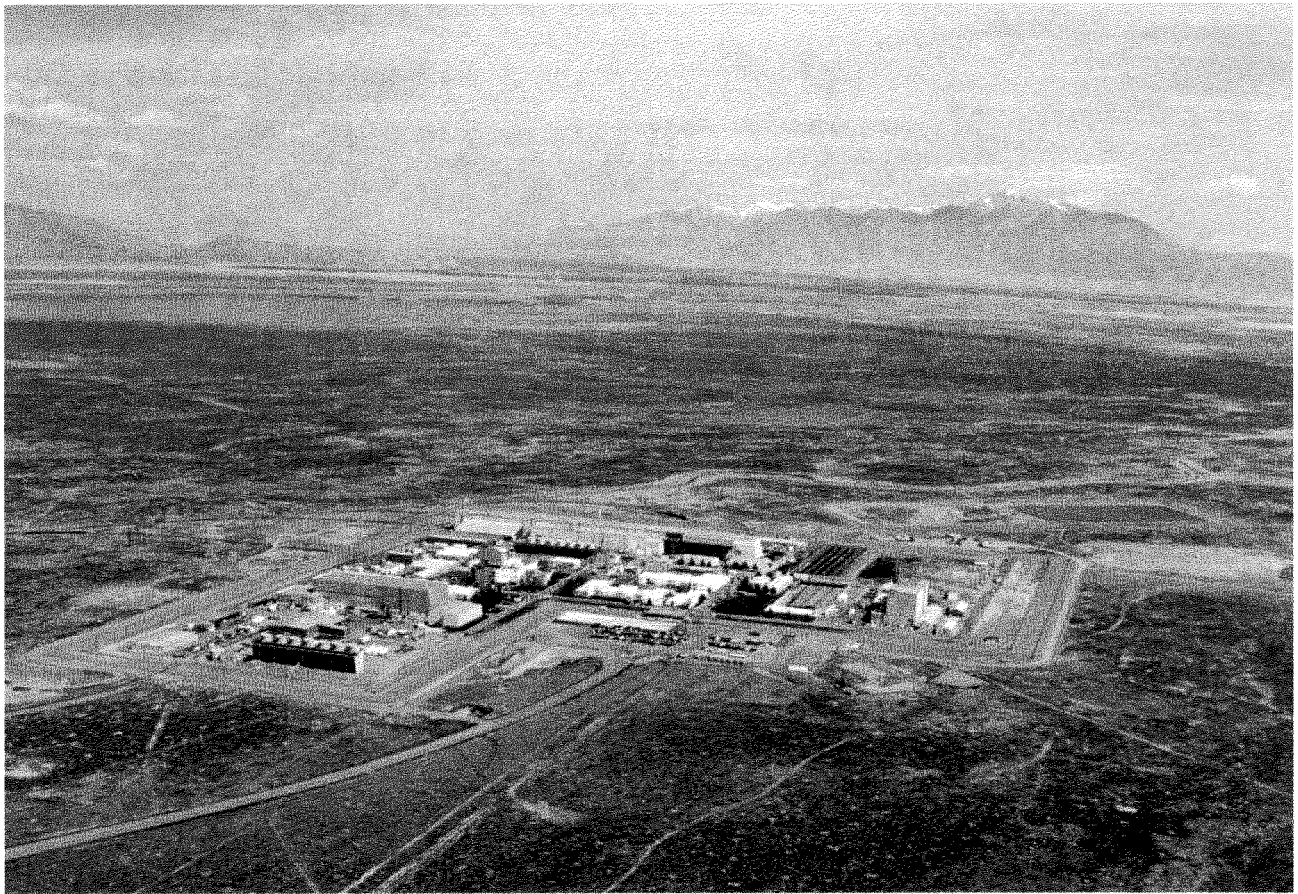
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# **2003 Institutional Control Monitoring Report**

## **for the**

### **Naval Reactors Facility**

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**Institutional Control Monitoring Report**  
**for the**  
**Naval Reactors Facility**  
**Waste Area Group 8**

**December 2003**

**Prepared for the  
U.S. Department of Energy  
Pittsburgh Naval Reactors Office  
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## **ABSTRACT**

This Institutional Control Monitoring Report assesses the adequacy of Institutional Controls (ICs) being implemented at the Naval Reactors Facility in accordance with two past Records of Decision and as described in the Institutional Control Plan (Appendix D of the Phase II Work Plan for Operable Unit (OU) 8-08 remediation). ICs preserve the underlying assumptions of Remedial Investigation/Feasibility Studies developed for Waste Area Group (WAG) 8 that will protect human health and the environment. The ICs are selected remedies for 'No Further Action' sites, and are part of the selected remedies for the NRF Inactive Landfill Areas (OU 8-05 and 8-06) and for radiological (OU 8-08) sites.

ICs specified in the WAG 8 Records of Decision assume that NRF remains under Federal Government Control for at least 100 years following completion of the RODs. The ICs include visible access restrictions and procedures to control activities and unauthorized access.

## 1.0 Purpose

The purpose of this Institutional Control Monitoring Report is to assess the adequacy of Institutional Controls implemented for various Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites at Waste Area Group (WAG) 8 at the Idaho National Engineering and Environmental Laboratory (INEEL). The Naval Reactors Facility (NRF) has been identified as WAG 8 by the Federal Facility Agreement and Consent Order (FFA/CO). In May 1999, the Environmental Protection Agency (EPA) Region 10 issued the final policy on the Use of Institutional Controls at Federal Facilities. As part of that policy, an Institutional Control Monitoring Report was requested to be completed annually. Useful information is also contained in a fact sheet issued by the U.S. EPA entitled "Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups, EPA 540-F-00-005, OSWER 9355.0-74FS-P, September 2000." This document is available at [www.epa.gov](http://www.epa.gov).

## 2.0 Background

Two Records of Decision (RODs) have been signed for WAG 8. The first ROD was signed in 1994, and specified remedial actions for three inactive landfill sites at NRF that were part of Operable Units 8-05 and 8-06. The remedial actions included placement of a native soil cover over the landfill areas, periodic inspection and maintenance, soil gas and groundwater monitoring, and maintaining Institutional Controls. Institutional Controls are visible access restrictions and procedures to control activities and unauthorized access at CERCLA sites to minimize potential exposure to contaminants that may remain at the sites, and to prevent disturbance of selected remedies.

The second ROD was signed in 1998 for OU 8-08, which was identified as the NRF Comprehensive Remedial Investigation and Feasibility Study (RI/FS). That ROD specified remedial actions at nine radiologically contaminated sites, and identified 12 'No Further Action' sites.

The remedial actions selected for the nine radiological sites (described in the Phase I Remedial Design/Remedial Action (RD/RA) Work Plan) included excavating soil to below CERCLA cleanup levels to at least 10 feet below ground surface; consolidation of soil at the S1W Leaching Beds; placement of engineered covers at three locations; monitoring; and institutional controls. In 2001, in response to more than expected contamination being found in NRF-21A, a decision was made to stop soil removal at this site, and to proceed with planning to cover the area with an engineered earthen cap. This decision was documented in an Explanation of Significant Difference to the ROD.

'No Further Action' sites are defined as follows: areas where contamination above risk based levels could be present; therefore, they are not yet releasable for unrestricted use, and thus require the presence of Institutional Controls (ICs). The 1998 ROD defined these sites as follows: "The 'No Further Action' decision means that the site will be included in the CERCLA review performed at least every five years to ensure that site conditions used to evaluate the site have not changed and to verify the effectiveness of the 'No Further Action' decision. All monitoring data collected from the 'No Further Action' sites will be included in the CERCLA five year review. Although no additional remedial action is required at this time, present institutional controls, such as current fencing and administrative controls on excavation, will be maintained. If site conditions change, including present institutional controls, additional sampling, monitoring, or action will be considered."

Institutional Controls may include the following:

- 1) Visible access restrictions
  - a) Warning signs
  - b) Fences, barriers, or permanent markers
- 2) Procedures to control site activities:
  - a) Bettis Site Development Plan
  - b) OU 8-08 Areas Operation and Maintenance Plan
  - c) OU 8-05/6 Landfill Operation and Maintenance Plan
  - d) Public Notices
  - e) Department of Energy Directives
  - f) Site Radiological Controls Requirements
  - g) Personnel Training
  - h) Excavation Controls
- 3) Inspections
- 4) Unauthorized access safeguards
- 5) Published Surveyed Boundaries
- 6) Notice to affected stakeholders
- 7) Property lease and transfer regulatory requirements

The various CERCLA sites requiring institutional controls are briefly discussed below and are shown on Figure 1. The sites marked in red on Figure 1 are those where remedial actions were performed or will be performed. The sites marked in blue are the 'No Further Action' sites.

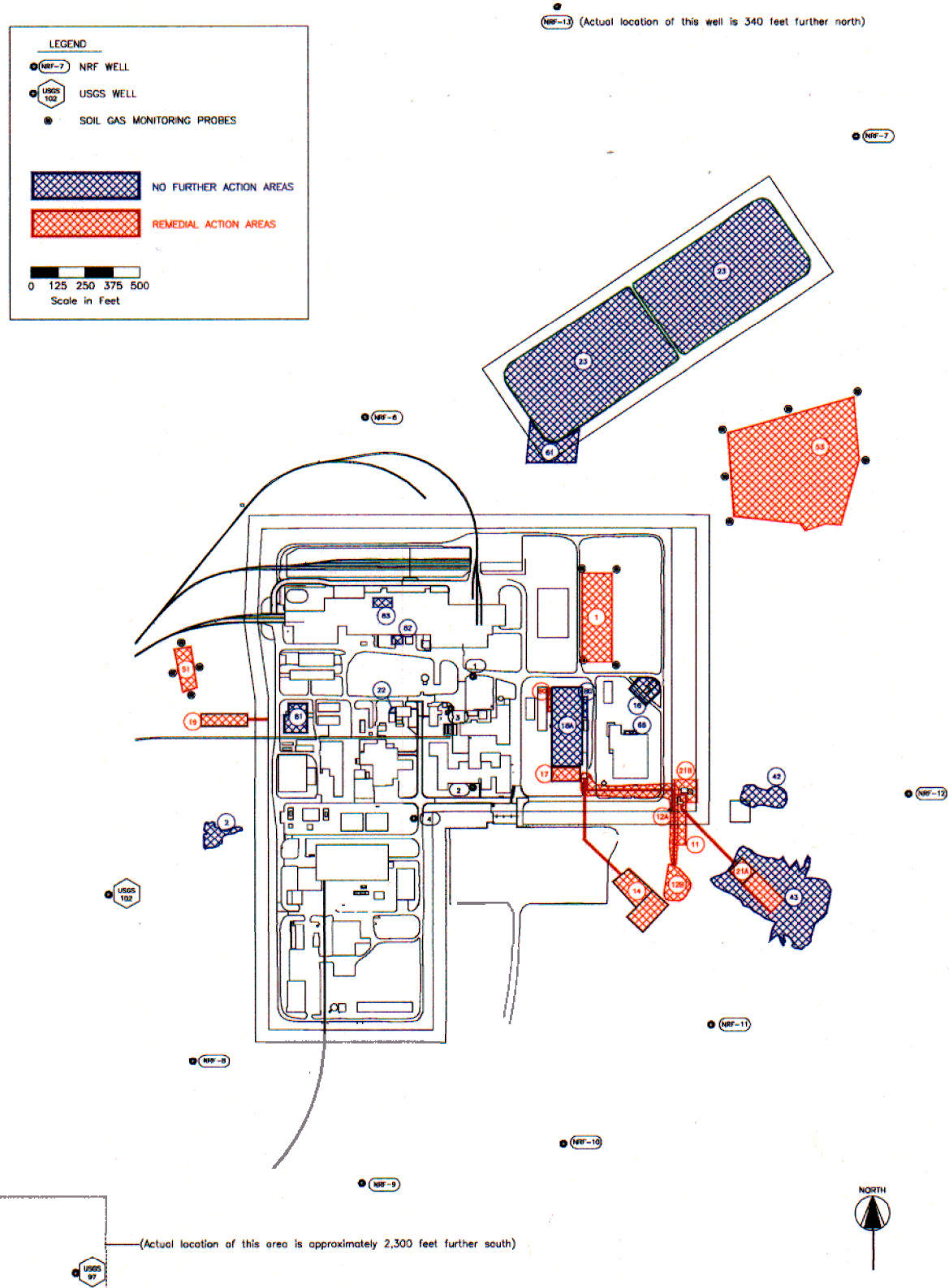


Figure 1 Location of NRF CERCLA Sites



## 2.1 Inactive Landfill Areas

**NRF-1 Field area North of S1W** – This site is similar to a municipal landfill containing construction debris and refuse such as petroleum products, small amounts of paint, solvents, and cafeteria wastes. NRF-1 was used between 1951 and 1960. A landfill cover was constructed over the site in 1996.

**NRF-51 West Refuse Pit #4** – This site is similar to a municipal landfill containing construction debris and refuse such as petroleum products, small amounts of paint, solvents, and cafeteria wastes. This site was also used as a material staging area. NRF-51 was used between 1951 and 1963. A landfill cover was constructed over the site in 1996.

**NRF-53 East Refuse Pits and Trenching Area** – This site is a trenching and pit disposal area used for general refuse. The site was used between 1956 and 1970. Several types of refuse were disposed of here, including cafeteria wastes, leaves, grass, paper, small amounts of metal, oil, paints, and solvents. Refuse disposal occurred in trenches, and was regularly burned. A landfill cover was constructed over the site in 1996.

## 2.2 'No Further Action' Sites

**NRF-02 Old Ditch Surge Pond** - This site is a pond area that was connected to the industrial waste ditch system. Low-levels of radioactivity and slightly elevated levels of metals were detected in the pond. The pond was used from approximately 1959 to 1985. The pond became contaminated with very low levels of radioactivity when water with trace amounts of cobalt-60 and cesium-137 was released to the ditch in the late 1960s. Accumulation of radioactivity in the ditch sediments produced slightly elevated levels that are below remediation goals.

**NRF-16 Radiography Building Collection Tanks** - The building was originally a decontamination building used for cleaning radioactive equipment. The decontamination solutions were sent to two underground tanks. These tanks were used from 1954 to 1960. Adjacent to the building was a concrete pad that was used for outdoor storage of radioactive material. The concrete pad was removed in 1979. The tanks were removed in 1993 with no indication of leakage. Elevated levels of radionuclides were detected in the surface soil from past spills in the area, but the levels were below remediation goals.

**NRF-18A S1W Spray Pond #1** - The S1W Spray Pond #1 is a large concrete structure that contained cooling water for plant operations. At one time, a chromium based corrosion inhibitor was used in the water. Leakage and overspray from the pond caused elevated chromium concentration in the surrounding soil. A risk assessment showed a low risk for this site assuming the Spray Pond remains in place, thus limiting exposure to the soil below the basins in the event that any contamination is present.

**NRF-22 A1W Painting Locker French Drain** - This site is the location of a former French drain that may have received paints, solvents, and possibly mercury. A removal action was performed in 1994 after receiving public comment on the proposed action. Sampling performed after the removal action showed elevated levels of lead and mercury remained. The excavated hole was 12 feet deep and was grouted to the surface eliminating all exposure pathways. The risk assessment of the site after the removal action estimated the risk to be low.

**NRF-23 Sewage Lagoons** - This site is the current sewage lagoons. The lagoons are two open rectangular ponds that measure 425 feet by 725 feet each. Sampling of the sediment has shown elevated levels of metals and radionuclides and only trace amounts of organics. The risk assessment assumed an institutional control period of 100 years. The risk assessment was very conservative and a risk management decision was made that the actual risks are acceptable.

**NRF-42 Old Sewage Effluent Ponds** - This site is the location of a former temporary sewage pond used in the 1950s. There is no evidence that a hazardous source exists at the site, but elevated amounts of metals, semi-volatile organics, and low-level radionuclide contaminants may be present based on sampling performed in the current sewage lagoons. The site is currently covered with a 10 foot layer of soil. Based on current conditions (i.e., 10 foot soil cover), the risk was estimated to be low.

**NRF-43 Seepage Basin Pumpout Area** - This site is an area that physically surrounds NRF-21A and was formed when the contents of NRF-21A (Old Sewage Basin) were pumped out in 1958. During the spring and summer of 2002, in conjunction with remediation of NRF-21A, the amount of contaminated soil and the size of NRF-21A was much larger than anticipated. A portion of NRF-21A extended into the previously identified NRF-43 area. NRF and the regulatory agencies decided that NRF-21A including the extended portion into NRF-43 would be capped with an earthen cover similar in design to those slated for NRF-12/14 and NRF-19. Construction of the cover is scheduled to begin in 2004.

**NRF-61 Old Radioactive Materials Storage and Laydown Area** - This site is the former location of a radioactive material storage and laydown area that was used from 1954 to 1960. Soil sampling showed detectable amounts of cesium-137 that were well below remediation levels. The risk was determined to be low.

**NRF-66 Hot Storage Pit** - This site is an area where a tanker truck collected radioactive liquid waste for transportation to other INEEL facilities for processing. Spills reportedly occurred in this area. Contaminated soil was removed from the area in 1980. Sampling during the remedial investigation showed slightly elevated amounts of cesium-137 that were well below remediation levels.

**NRF-81 A1W Processing Building Area Soil** - This site is an area around a radioactive materials processing building where known spills have occurred in the past. Typically, these spills were cleaned up to the maximum extent possible at the time. Cesium-137 and cobalt-60 were the only radionuclides detected during past sampling, and were below remediation levels.

**NRF-82 Evaporator Bottoms Tank Release** - This site consists of the soil above an underground storage tank vault. One spill was known to have occurred at the area in 1972. The spill was cleaned up to the standards at the time, but slightly elevated amounts of radioactivity were reported after the cleanup. Additional cleanup was performed in 1977. The remaining radioactivity is below remediation levels.

**NRF-83 ECF Hot Cells Release Area** - NRF-83 is located within an operational building (Expended Core Facility) and is adjacent to hot cells that are currently in use. This site is the location of a radioactive liquid release that occurred in 1972. Radioactive liquid was released from a pipe to a concrete trench. The soil below and adjacent to the trench also became contaminated. Cleanup actions taken in 1972 did not include the soil below the trench. The contaminated soil was discovered in 1997 when a concrete pad adjacent to the concrete trench

was removed during ECF upgrade work. Elevated amounts of cobalt-60 and cesium-137 are present in the soil. All accessible contaminated soil was removed and replaced with clean soil during the construction project. An estimated 28 cubic meters of contaminated soil remains under the trench to preserve the integrity of the trench. A new concrete pad was poured at the location of the old concrete pad excavation. The contaminated soil below the trench is not presently accessible and no exposure route is available.

### 2.3 Remedial Action Sites (OU 8-08)

**NRF-11 S1W Tile Drainfield and L-shaped Sump** - This site consisted of a below-surface concrete L-shaped sump and four underground perforated drainfield pipes of various lengths downstream of the sump. The drainfield was likely used between 1953 and 1955 for sewage and radioactive liquid discharges. The drainfield area was approximately 36 feet wide by 150 feet long and consisted of four perforated pipes buried parallel to each other approximately eleven feet deep. Each outside leg of the drainfield extended about 150 feet, while both inner legs were 50 feet long. The drainfield was connected to the sump, which was an L-shaped concrete structure. Each leg of the sump was 11 feet long and three feet wide with a maximum depth of 12-1/2 feet. The sump was isolated from the drainfield in 1955, but was used until 1960 as part of the sewage system. The primary remedial action associated with this site was excavation of piping, concrete, and soil above remediation goals. During the summer of 2002, piping and concrete associated with this site was removed. Soil above remediation goals was removed, leaving only trace amounts of contamination. **Action completed.**

**NRF-12A Underground Piping Leading to Leaching Pit** - This site consisted of an underground pipe (465 feet) that ran from the S1W Retention Basins (NRF-17) to a subsurface concrete manhole. This pipe is known to have leaked on occasion. From the manhole, a perforated pipe used for draining and leaching purposes ran approximately 400 feet to the S1W Leaching Pit (NRF-12B). This site was used from 1955 through 1961 for radioactive liquid discharges. The primary remedial action associated with this site was excavation of piping and removal of soil above remediation goals and removal of the manhole. The piping leading from the leaching pit to the concrete culvert near the L-Shaped Sump has been removed, as has contaminated soil above the cleanup standards within at least ten feet of the ground surface. The line and associated contaminated soil from the concrete culvert to the old retention basin were also removed. Residual contamination above CERCLA remediation levels exists below the ten foot depth along some locations where the pipe has been removed. **Action completed.**

**NRF-12B S1W Leaching Pit** - This site consists of a former pit area that was used for radioactive discharges. The pit was constructed at the end of the drainfield piping (NRF-12A) in 1957 and was used until 1961. The pit was filled in with soil, and in 1978 an asphalt cap was placed over the pit. In preparation for construction of an earthen cover, the asphalt cap was demolished and removed during the summer of 2003. The primary remedial action associated with this site is the construction of an engineered cover over the area, which will include site NRF-14 discussed below.

**NRF-14 S1W Leaching Beds** - This site consists of two leaching beds, one constructed in 1960 and the other in 1963. These beds were open ponds that collected radioactive water and allowed the water to leach into the subsurface or evaporate. Each bed was about 75 feet by 125 feet at the water line and was 13 to 15 feet deep. The ponds were used until 1979. Large cobblestones were placed in the leaching beds in 1972. Earthen ramps were constructed to allow sampling equipment into the beds in 1992. This site includes the underground pipe leading to the leaching beds from the S1W Retention Basins (NRF-17). The primary remedial

actions associated with this site are the excavation of the pipe leading to the beds, consolidation of soil from other CERCLA sites in the beds, and construction of an engineered cover over the area. The pipe leading to the beds has been excavated. Contaminated soil above remediation levels was encountered within 10 feet of the surface along a small portion of pipe and was removed. Residual contamination exists below the 10 foot depth along a small portion of the pipe location. Soft sided containers containing soil removed from other remediation sites were placed in the beds and covered with clean fill dirt in preparation of the construction of the earthen cover in 2004. Residual contamination exists below the 10 foot depth along a small portion of the pipe location.

**NRF-17 S1W Retention Basins** - This site consisted of two concrete basins partially below grade that collected radioactive water from various facilities. This was a storage area prior to releasing the water to NRF-11, NRF-12A/12B, and NRF-14. The basins were constructed in 1951. The basins were two adjacent concrete structures, each 140 feet long by 34 feet wide. One of the basins was known to have leaked approximately 33,000 gallons in 1971. The leak was directly below the basins. The remedial actions associated with this site were the removal of the concrete structures and excavation of contaminated soil above remediation levels. Demolition of the concrete structures and removal of contaminated soil beneath is complete. Residual radioactivity levels remain detectable, but are below remediation goals. **Action completed.**

**NRF-19 A1W Leaching Bed** - This site consisted of an underground leaching bed. Perforated pipes ran through an engineered leaching bed that consisted of various layers of gravel and sand. The bed was constructed west of NRF in 1957, and was used continually from 1958 to 1964 and sporadically between 1964 and 1972. The bed was 200 feet long and 50 feet wide. Two underground pipes led to the leaching bed. The remedial actions associated with this site were the excavation of the pipes leading to the bed and any associated contaminated soil, and the future construction of an engineered cover over the area (yet to be completed). The piping leading to the beds and the contaminated soil above remediation levels have been excavated. The area was covered with clean fill dirt in 2003.

**NRF-21A Old Sewage Basin** - This site consists of a former open pond used for non-radiological discharges that was cross-contaminated from a radiological system. An unknown amount of radioactive effluent was sent to the sewage basin. The sewage basin was constructed in 1956 and measured 72 feet by 72 feet by 11 feet deep. A 10-inch concrete pipe led to the sewage basin from the L-shaped sump (part of NRF-11). The basin was enlarged in 1957 in the southeast direction to approximately double the original length and was used until 1960. The basin has since been filled in with soil. The remedial actions associated with this site were the excavation of piping and contaminated soil above remediation levels. After a portion of the piping and contaminated soil had been excavated, it was determined that contaminated soil above the remediation level extended significantly into the expanded portion of the basin. In July 2002, an Explanation of Significant Difference was signed by Naval Reactors IBO, the State of Idaho, and the EPA, and issued to the public to modify the preferred remedy to include construction of an engineered natural earthen cover over the original and expanded area. The concrete pipe and contamination adjacent to the pipe has been removed. The existing mound over the basin has also been removed and the area prepared for cover construction that is planned for 2004.

**NRF-21B Sludge Drying Bed** - This site consisted of a concrete bed that received sludge from the sewage system. It was cross-contaminated from a radiological system. The bed was constructed in 1951 as part of the sewage system at NRF. The bed was a concrete slab that

was 28 feet by 29 feet and was approximately five feet below grade. The primary remedial actions associated with this site were the excavation of concrete and soil above remediation levels. Contaminated sediment above the concrete bed was removed along with the concrete. Analytical results from soil samples collected after the excavation was completed verified that no contamination remained at the site above remediation goals. **Action Completed.**

**NRF-80 A1W/S1W Radioactive Line Near BB19** - This area consisted of an underground pipe that was known to have leaked near the S1W Spray Pond. The pipe carried radioactive water for eventual discharge to the S1W Leaching Beds (NRF-14). The pipe was buried approximately six feet below the surface. During decontamination and dispositioning work at NRF in 1995, portions of the pipe were removed and contamination was detected in the soil. The primary remedial actions associated with this site were the excavation of piping and contaminated soil above remediation levels. Remedial actions have been completed at this site; contaminated soil above remediation levels was not encountered. The remaining soil has elevated radioactivity below remediation levels, primarily cobalt-60. **Action completed.**

### **3.0 Facility-wide Institutional Controls**

#### **3.1 Soil Disturbance**

A significant control required for the NRF CERCLA areas discussed above is preventing unauthorized disturbance of soil. NRF addresses unauthorized or accidental excavation in these areas using a combination of training and engineering controls to ensure that no excavation occurs without first obtaining the concurrence of NRF environmental personnel. These controls are included in several NRF guidance and policy manuals. Together, these actions constitute NRF's site-wide ICs for controlling excavation activities. Each aspect of the ICs is discussed below.

##### **3.1.1 Cognizant Engineer/ESH Engineer**

The NRF Cognizant Engineer or Scientist (CE/S) is the person who is primarily responsible for ensuring that rules for performing various work functions are followed and that work is performed according to written procedure. All work at NRF is documented in one of three ways. These are Preventive Maintenance (PM) cards, Technical Specifications, or Technical Work Documents (i.e., Route Card for normal radiological work; Radiological Work Permits for work in areas previously released for controlled use but where contamination may still exist on inaccessible surfaces; and NRF forms containing site-specific information for non-radiological work). These documents and associated work must be reviewed and approved by the NRF Environmental Safety and Health (ESH) Engineer assigned to the work group initiating the work evolution. For example, if this work involves excavation, the NRF CE/S must ensure an excavation permit is prepared, as discussed below.

##### **3.1.2 Excavation Permits**

Integral to the process of preventing unauthorized excavation of CERCLA sites is the 'Excavation Permit'. This permit is initiated by the CE/S, and is required for all excavation activities at NRF. The Excavation Permit identifies each NRF organization that must be notified prior to the commencement of excavation, including Radiological Controls, Environmental Remediation (for CERCLA), Safety and Environmental Engineering. Cognizant personnel are trained in the initialization procedures and use of the Excavation Permit.

### **3.1.3 Personnel Training**

Training is the primary tool used at NRF to ensure that all personnel know their responsibilities. NRF has several training programs that contribute to the concept of Institutional Controls. The Environmental Training Program helps ensure that personnel involved in activities with environmental concerns will follow procedures and communicate with others as needed.

Each employee at NRF receives general ESH training, in the form of annual training and weekly bulletins covering a broad range of ESH issues. All NRF employees and subcontractors are routinely trained to be sensitive to identification of CERCLA sites, and instructed not to enter any CERCLA site without first contacting Environmental Remediation.

### **3.2 Unauthorized Access**

At NRF, all CERCLA sites are either within the main NRF fenced area or within a short distance of the outer perimeter fence (i.e., within areas monitored by NRF Security). In addition, INEEL security personnel are responsible for controlling access onto the INEEL and for patrolling all areas at the INEEL outside secured compounds, including NRF. INEEL security is effective in stopping accidental incursion onto the INEEL and prohibiting deliberate incursion. Thus, CERCLA areas outside the NRF perimeter fence are protected.

Although INEEL personnel are responsible for security outside the NRF perimeter fence, areas that are near NRF are watched by NRF security personnel as well. Any unusual or unexpected activity outside the perimeter fence is immediately reported to and investigated by INEEL and/or NRF security personnel. Any activity being performed by NRF personnel (or other authorized personnel) outside the perimeter fence must be reported to NRF security prior to its initiation.

As part of local security measures, all NRF personnel receive badges that must be worn in a conspicuous location on their persons at all times. This significantly reduces the chance that unauthorized personnel could intrude onto the NRF site in general, and specifically the CERCLA sites, without being detected. Similar badging procedures are practiced at other INEEL sites. All personnel that visit the INEEL must receive temporary badges upon presentation of proper identification and upon approval from cognizant INEEL personnel. Uncleared visitors without building access only (BAO) authorization are escorted to and from NRF. All non-routine access roads leading to NRF are blocked by road closed signs instructing personnel to contact security before proceeding.

### **3.3 Radiological Controls**

NRF has a very thorough Radiological Controls Program that includes administrative controls, access restrictions, and training. All areas with the potential for radiological contamination, including CERCLA sites, require strict controls on access and work to minimize contact by personnel and minimize the potential spread of contamination. All work in potentially radiologically contaminated areas requires a Technical Work Document (TWD). All radiological TWDs are carefully reviewed by personnel trained in Radiological Controls and their approval is required before work can commence. Once work commences, Radiological Controls provides overview of the project.

All employees and visitors to the NRF site receive, as a minimum, training that identifies potential radiological hazards, recognition of warning barriers and signs, and response

requirements to radiological situations. All NRF employees receive annual radiological refresher training. A large number of NRF employees and subcontractors also receive additional training to be qualified to work in or near specific radiological sites.

All areas with the potential for radioactivity are routinely monitored for fixed and loose contamination. All NRF radiological personnel receive some level of medical surveillance for potential internal exposure to radioactivity. Those who routinely work in potentially radiologically contaminated areas receive more frequent radiological monitoring.

#### 4.0 Site-specific Institutional Controls

In addition to facility-wide ICs in place at NRF, site-specific ICs are present at most sites. Table 1 below provides a description of the current (or planned denoted by \*) controls in place at each of the specific sites.

<b>Table 1 Site Specific Institutional Controls</b>		
<b>CERCLA Site</b>		<b>Site-Specific Institutional Controls</b>
<b>Landfill Sites</b>		
<b>NRF-1</b>	<b>Field Area North of S1W</b>	<ul style="list-style-type: none"> <li>• Fencing</li> <li>• Excavation Controls</li> <li>• Signs</li> <li>• Inspections</li> </ul>
<b>NRF-51</b>	<b>West Refuge Pit #4</b>	<ul style="list-style-type: none"> <li>• Fencing*</li> <li>• Excavation Controls</li> <li>• Signs</li> <li>• Inspections</li> </ul>
<b>NRF-53</b>	<b>East Refuge Pit and Trenching Area</b>	<ul style="list-style-type: none"> <li>• Fencing*</li> <li>• Excavation Controls</li> <li>• Signs</li> <li>• Inspections</li> </ul>
<b>No Further Action Sites</b>		
<b>NRF-2</b>	<b>Old Ditch Surge Pond</b>	<ul style="list-style-type: none"> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-16</b>	<b>Radiography Building Collection Tank Area</b>	<ul style="list-style-type: none"> <li>• Existing fence also within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-18A</b>	<b>S1W Spray Pond #1 and Portions of the Fire Protection System</b>	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Signs*</li> <li>• Excavation Controls**</li> <li>• Inspections</li> </ul>
<b>NRF-22</b>	<b>A1W Painting Locker French Drain</b>	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Excavation Controls**</li> <li>• Inspections</li> </ul>

\* Controls that are not currently in place but are planned.

\*\*Currently beneath a structure.



<b>Table 1 Site Specific Institutional Controls (Continued)</b>		
<b>CERCLA Site</b>		<b>Site-Specific Institutional Controls</b>
<b>NRF-23</b>	<b>Sewage Lagoons</b>	<ul style="list-style-type: none"> <li>• Existing Fencing</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-42</b>	<b>Old Sewage Effluent Ponds</b>	<ul style="list-style-type: none"> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-43</b>	<b>Seepage Basin Pumpout Area</b>	<ul style="list-style-type: none"> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-61</b>	<b>Old Radioactive Materials Storage and Laydown Area</b>	<ul style="list-style-type: none"> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-66</b>	<b>Hot Storage Pit</b>	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-80</b>	<b>A1W/S1W Radioactive Line Near Butler Building 19</b>	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-81</b>	<b>A1W Processing Building Area Soil</b>	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-82</b>	<b>Evaporator Bottoms Tank Release</b>	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
<b>NRF-83</b>	<b>ECF Hot Cells Release Area</b>	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Excavation Controls**</li> <li>• Inspections</li> </ul>

\* Controls that are not currently in place but are planned.

\*\*Currently beneath a structure.



Table 1 Site Specific Institutional Controls (Continued)		
CERCLA Site		Site Specific Institutional Controls
<b>8-08 Radiological Sites</b>		
NRF-11	S1W Tile Drainfield and L Shaped Sump	<ul style="list-style-type: none"> <li>• Portion within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
NRF-12A	Underground Piping to Leaching Pit	<ul style="list-style-type: none"> <li>• Portion within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
NRF-12B	S1W Leaching Pit	<ul style="list-style-type: none"> <li>• Fencing*</li> <li>• Excavation Controls</li> <li>• Engineered Earthen Cover*</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
NRF-14	S1W Leaching Beds	<ul style="list-style-type: none"> <li>• Fencing*</li> <li>• Excavation Controls</li> <li>• Engineered Earthen Cover*</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
NRF-17	S1W Retention Basin	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
NRF-19	A1W Leaching Bed	<ul style="list-style-type: none"> <li>• Fencing*</li> <li>• Excavation Controls</li> <li>• Engineered Earthen Cover*</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
NRF-21A	Old Sewage Basin	<ul style="list-style-type: none"> <li>• Fencing*</li> <li>• Excavation Controls</li> <li>• Engineered Earthen Cover*</li> <li>• Signs*</li> <li>• Inspections</li> </ul>
NRF-21B	Sludge Drying Bed	<ul style="list-style-type: none"> <li>• Within NRF Fenced Area</li> <li>• Excavation Controls</li> <li>• Signs*</li> <li>• Inspections</li> </ul>

\* Controls that are not currently in place but are planned.

\*\*Currently beneath a structure.

Site specific controls include fencing, signs, and inspections. Inspections are discussed in Section 5. Fencing and signs are visible access restrictions and are discussed in detail in Section 4.1 of the NRF Institutional Control Plan. In brief, warning signs required for ICs will be conspicuously placed intermittently along the boundary of a controlled area. NRF CERCLA warning signs will possess an orange background with black lettering, the font of which will be proportional to the size of the sign. Signs will be at least 8.5 x 11 inches. Warning signs will indicate site name, general hazard (i.e., 'Radionuclides', 'Metals', etc.), access restrictions (i.e., 'No Unauthorized Excavation'), and point of contact (e.g., 'Environmental Affairs').

## **5.0 Facility Wide Inspections**

### **5.1 Inspection Methodology**

The NRF inspection plan is currently applicable to the inactive landfill areas, the site benchmarks located within each cover area, soil gas wells, groundwater monitoring wells, and 'No Further Action' sites. Each of these is inspected at least annually. The following sections discuss the inspection details.

#### **5.1.1 Engineered Cover Area Inspection**

The annual inspection of the engineered covers over the inactive landfill areas are recorded on an inspection form (see Attachment 1). Elements of the site inspection are as follows:

1. Observe any areas on the cover that indicate signs of subsidence (e.g., obvious visible low spots on the cover surface where significant amounts of standing water could accumulate during major precipitation events).
2. Check for the presence of large cracks on the surface of the cover or signs of animal intrusion.
3. Observe any signs of erosion on the landfill cover (e.g., during windy conditions observe any evidence of dust blowing off of the cover, and check for erosion caused by storm-water runoff).
4. Check the condition of the vegetative cover (e.g., check for bare spots in the vegetative cover; note whether no vegetation has grown or whether the vegetation has died and has not been re-established; check for abnormal growth of weeds that may crowd out desired vegetation).
5. Check for any damage to the signs, fencing, fence posts, and access gates located near or around the sites.

An inspection of the covers is conducted after a significant precipitation event (e.g., severe thunderstorms, prolonged rain events, or rapid snow melting) in which the soil's infiltration capacity is exceeded. This is done to determine whether significant erosion or run-on/runoff has occurred. Indications of water run-on (from adjacent areas) to and runoff from the cover areas will be recorded during the inspection and rectified by diverting the run-on source and making repairs to the areas where excessive erosion has taken place on the cover. The areas where excessive erosion has occurred will be evaluated and a determination will be made as to the cause of the erosion.

#### **5.1.2 Site Benchmark Inspection**

The benchmarks around the designated OU 8 areas, including soil gas and groundwater monitoring wells, are inspected annually, and results of the inspection will be recorded on an inspection form (see Attachment 1). Elements of the site inspection are as follows:

1. Check the condition of the brass benchmark implanted on the concrete pad. Ensure the concrete has not deteriorated around the benchmark and that the etched mark is still legible.

Check for cracks on the concrete pad (monitor any minor cracks to ensure they do not widen and compromise the pad's integrity).

2. Check the general condition of the bollards that encircle the benchmark concrete pad; make sure the bollards are intact (have not been knocked over by a vehicle), are painted properly, and the paint is in good condition.

### **5.1.3 Soil Gas Monitoring Well Inspection**

A routine visual and functional inspection of the soil gas monitoring wells is conducted during the scheduled sampling of these locations (4 times per year). Any obvious problems will be immediately reported to Environmental Remediation personnel. An annual inspection shall be conducted with the results of the inspection recorded on an inspection form (see Attachment 2). Elements of the site inspection are as follows:

1. Check the well casing for signs of damage. Verify that it is intact, corrosion free, and undamaged.
2. Check to ensure that locks are in working condition. Look for signs of corrosion and forced entry.
3. Ensure that the well is functioning correctly (problems reported as needed after quarterly sampling).
4. Verify that the concrete pad and bollards are undamaged. Also verify that the yellow and black paint on the bollards is in good condition.

### **5.1.4 Groundwater Monitoring Well Inspection**

A routine visual and functional inspection of the groundwater monitoring wells is conducted during the scheduled sampling of these locations (3 times per year). Any obvious problems will be immediately reported to Environmental Remediation personnel. An inspection will be conducted annually with the results of the inspection recorded on an inspection form (see Attachment 3). Elements of the inspection are as follows:

1. Check to ensure that locks are in working condition. Look for signs of corrosion and forced entry.
2. Check the housing around the well head. Verify that it is intact, corrosion free, and undamaged. Ensure that the lock hasp is intact and free from damage and corrosion. Look for signs of forced entry.
3. Check electrical wiring and plug for signs of damage.
4. Check the measuring line pipe and discharge pipe for signs of corrosion. Ensure that caps are present on these two pipes.
5. Verify that the concrete pad and bollards are undamaged. Also verify that the yellow paint on the bollards is in good condition.

6. Ensure that well is functioning correctly (problems reported as needed after trimester sampling).

### 5.1.5 'No Further Action' Sites

An inspection of the 'No Further Action Sites' is conducted annually to ensure that site conditions have not changed (i.e., that the site meets the 'No Further Action' criteria as described in the 1998 ROD). Results of the inspection will be recorded on an inspection form (Attachment 4).

1. Where applicable, look for evidence of human or animal intrusion.
2. Where present, ensure that signs that describe the nature of the site are clearly visible and undamaged.
3. Where present, ensure that fences are intact and in good condition.
4. Where present, inspect boundary markers.
5. Where appropriate, look for signs of unauthorized excavation.

## 5.2 Inspection Results

The following sections summarize 2003 inspection results as contained in the inspection checklists contained in Attachments 1-A through 4-A. Section 6.0 discusses inspection deficiencies in greater detail.

### 5.2.1 Engineered Cover Area Inspection

On October 2<sup>nd</sup> and 9<sup>th</sup>, 2003 inspections of the engineered landfill covers were performed. Table 2 summarizes the results of the inspections (Attachment 1-A). Photographs are included in Attachment 1-B.

**Table 2 Summary of Engineered Soil Cover Inspections**

Location	Subsidence or Slope Movement	Cracks or Animal Intrusion	Erosion	Non Growth Areas	Sparse Growth Areas	Weeds Encroaching.
NRF-1	None	None	None	SW corner	Some on east side	In SW corner & perimeter east end
NRF-51	None	Minimal/ant hills on west side.	None	Minimal	Some on west side	Encroachment by cheat grass.
NRF-53	None	Minimal/ant hills.	None	Minimal	Minimal at north N.E. corner.	Minimal

Minor = noticeable but small in comparison to the whole

Minimal = although present, it is not readily noticeable

### 5.2.2 Site Benchmarks

All benchmarks at the soil gas and groundwater monitoring wells were found to be in good shape. No problems were noted.

### 5.2.3 Soil Gas Monitoring Wells

On September 26, 2003 and October 2, 2003 inspections of the soil gas wells were performed. Table 3 summarizes the results of the inspections. Photographs are included in Attachment 1.

Table 3 Summary of Soil Gas Monitoring Wells Inspections					
	Location	Casing and Locks	Monitoring Tube	Concrete Pads and Bollards	Function
OU 8-05-1	MW1-1	Satisfactory	Satisfactory	Satisfactory	Collected sample; because of past problems, the well was replaced in November 2003.
	MW1-2	Satisfactory	Satisfactory	Satisfactory	Pulling high vacuum; the well was replaced in November 2003.
	MW1-3	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW1-4	Satisfactory	Satisfactory	Satisfactory	No problems noted
OU 8-05-51	MW51-1	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW51-2	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW51-3	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW51-4	Satisfactory	Satisfactory	Satisfactory	No problems noted
OU 8-06-53	MW53-1	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW53-2	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW53-3	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW53-4	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW53-5	Satisfactory	Satisfactory	Satisfactory	No problems noted
	MW53-6	Satisfactory	Satisfactory	Satisfactory	No problems noted

### 5.2.4 Groundwater Monitoring Wells

Between October 2 and 17, 2003, inspections of the following groundwater monitoring well were performed. Table 4 summarizes the results of the inspections (Attachment 3-A). Photographs are included in Attachment 3-B.

Well Name	Locks and Housing	Wiring	Measuring and Discharge Lines	Concrete Pads and Bollards
NRF-6	Satisfactory	Individual strands; needs wrapping.	Satisfactory	Paint faded
NRF-7	Lock stiff	Individual strands; needs wrapping.	Satisfactory	Paint faded and peeling
NRF-8	Satisfactory	Satisfactory	Satisfactory	Satisfactory
NRF-9	Satisfactory	Satisfactory	Satisfactory	Satisfactory
NRF-10	Satisfactory**	Satisfactory	Satisfactory	Satisfactory
NRF-11	Satisfactory**	Satisfactory	Satisfactory	Satisfactory
NRF-12	Satisfactory	Satisfactory	Satisfactory	Satisfactory
NRF-13	Satisfactory	Satisfactory	Satisfactory	Satisfactory

\*\*Corner weld on housing is cracked; however, the box remains protective.

### 5.2.5 'No Further Action' Sites

Between October 2, 2003 and October 9, 2003, inspections of the 'No Further Action, sites were performed. Table 5 summarizes the results of the inspections (Attachment 4-A). Photographs are included in Attachment 4-B.

Location Name	Human/Animal Intrusion/Excavation	Signs	Fences	Boundary Markers
NRF-2	Satisfactory	Not present	NA	NA
NRF-16	Satisfactory	Not present	Satisfactory	NA
NRF-18A	Satisfactory	Not present	NA	NA
NRF-22	NA	Not present	NA	NA
NRF-23	Satisfactory	Not present	Sagging Barbwire	Satisfactory
NRF-42	Satisfactory	Not present	NA	NA
NRF-43	Satisfactory	Not present	NA	NA
NRF-61	Satisfactory	Not present	Satisfactory	NA
NRF-66	Satisfactory	Not present	NA	NA
NRF-80	Satisfactory	Not present	NA	NA
NRF-81	Satisfactory	Not present	Sagging Barbwire	NA
NRF-82	Satisfactory	Not present	NA	NA
NRF-83	NA	Not present	NA	NA

Not present = Installation of signs is planned in the future.

## 6.0 Deficiencies

No major deficiencies were noted in the way that ICs are implemented at NRF, nor did the site inspections reveal any major problems. Several minor issues were raised by the inspections. These are discussed below and are summarized in Table 6 below.

The vegetation at the engineered cover (NRF-1) continues to be sparse at the SW corner and along the east perimeter. This situation has been observed for several years, and though the natural re-vegetation process has increased the vegetation density, reseeded is needed in these areas. Reseeding was originally targeted to occur in the spring of 2003; however, a four year drought, and especially the very dry condition encountered in 2003, has delayed re-seeding. Reseeding during dry conditions would result in little growth especially since some evidence of dead grass was observed and the need to control cheat grass at NRF-51 may require re-seeding at this site as well. Re-seeding is now planned to coincide with seeding of the earthen covers to be built over the NRF-19, NRF-21A, and NRF-12A/14 areas. Evidence that vehicles have driven on the extreme west side of NRF-1 was visible. Only minor damage to some vegetation and to the surface of the cover was observed. This intrusion occurred prior to the placement of the signs and should not reoccur, but will continue to be monitored.

Last year, two of the soil gas monitoring wells located at OU 8-05-1 were found to be partially plugged. Since the mechanism causing the plugging problem was unknown, and their utility was in doubt; NRF replaced these wells during November 2003. During 2002, a third well was found to contain standing water. This problem was noted last year as being intermittent, and appeared to be related to precipitation events and standing water that accumulated in puddles next to the engineered cover. No water was observed in this well in 2003.

In 2003, as an additional protective measure, and as addressed in the 5-Year Review for the NRF Inactive Landfill Areas and the 2002 IC Monitoring Report, NRF posted the landfill areas with appropriate signs to warn employees, subcontractors, or potential trespassers of the nature of the site.

Several minor deficiencies were noted with the groundwater monitoring wells. All deficiencies are related to maintenance and do not affect the functioning of the wells. The USGS, which manages general repairs to NRF wells through its subcontract, was notified of the unsheathed wires and corrected the problem in December. Painting of the bollards will be performed by NRF as weather permits.

Signs for posting the 'No Further Action' areas have been ordered, and will be placed at these sites as weather conditions permit (this will be sooner than Appendix D (Institutional Control Plan) of the Phase II RD/RA Work states, which is that the signs would be placed after completion of Phase II Remedial Actions). The barbwire that surrounds NRF-81 was observed to be sagging in several locations, but has since been tightened. The condition of the fence itself is satisfactory. One segment of the fence that surrounds site NRF-23 is down and will be fixed when weather permits. Overall, the conditions at the 'No Further Action' sites have remained stable; therefore, no threat to human health or the environment is apparent.

As specified in the NRF ROD for OU 8-08, present ICs adequately protect the CERCLA areas from accidental or purposeful intrusion, and adequately protect the health and safety of NRF personnel and the public.



Table 6 Summary of Corrective Actions			
Location	Deficiency	Corrective Action	Corrective Time-Frame
NRF-1 and NRF-51	Sparse Vegetation	Reseeding	Fall 2004
MW-1 and MW-2	Uncertain Utility	Replace wells	Complete
NRF-6 and 7	Wires Unsheathed	Wrap wires	Complete
NRF-23	Fence Down	Fix fence	Scheduled as weather permits
No Further Action Sites	NA	Placement of signs at remaining sites.	As weather permits

### Section 7.0 Point of Contact

All questions or comments concerning NRF Institutional controls should be directed to Wendy R. Dixon of IBO/NR at (208) 533-5294.